2612/AF $

TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No. IFW

In Re Application Of:

CAMERON G. COFER, et al

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/943,677	8/31/2001	Samchuan Cua Yao	24021	1733	2612

Invention:

METHOD FOR FORMING ELECTRICALLY CONDUCTIVE IMPREGNATED FIBERS AND FIBER PELLETS

COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on

The fee for filing this Appeal Brief is: **$330.00**

☐ A check in the amount of the fee is enclosed.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **16-0325**

Signature

Dated: **July 30, 2004**

JOHN A. MOLNAR, JR.
Reg. No. 36,611
Parker-Hannifin Corporation
6035 Parkland Boulevard
Cleveland, Ohio 44124-4141
Phone: 216-896-2212
Fax: 216-896-4027

I certify that this document and fee is being deposited on **07/30/2004** with the U.S. Postal Service as first class mail under 37 C.F.R. 1.8 and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature of Person Mailing Correspondence

JOHN A. MOLNAR, JR.

Typed or Printed Name of Person Mailing Corres

cc:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of Cameron G. Cofer, *et al.*	)	
Serial No. 09/943,677	)	Before the Board of Patent Appeals and Interferences
Filed: August 31, 2001	)	
For: Method for Forming Electrically Conductive Impregnated Fibers and Fiber Pellets	)	
	)	July 30, 2004
Examiner Samchuan Cua Yao Group Art Unit 1733	)	Cleveland, Ohio 44124-4141

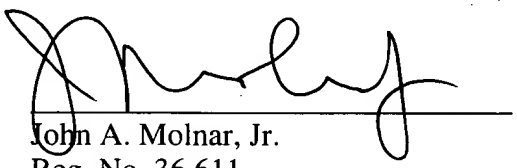
HONORABLE COMMISSIONER FOR PATENTS
ALEXANDRIA, VA 22313-1450

APPELLANTS' BRIEF ON APPEAL

Submitted herewith in triplicate in accordance with 37 C.F.R. § 1.192 is Appellants' Brief on Appeal. Reversal of the Examiner's rejection of the appealed claims and the allowance thereof is respectfully requested.

The Commissioner is authorized to charge the requisite fee or to credit any overpayment to Deposit Account No. 16-0325 (a separate deposit account authorization is enclosed).

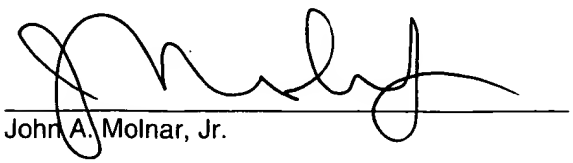
Respectfully submitted,



John A. Molnar, Jr.
Reg. No. 36,611
Attorney for Appellant
PARKER-HANNIFIN CORPORATION
6035 Parkland Boulevard
Cleveland, OH 44124-4141
Telephone: (216) 896-2212
Fax: (216) 896-4027

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited on July 30, 2004, with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Appeal Brief-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.



John A. Molnar, Jr.

I. REAL PARTY IN INTEREST

Parker-Hannifin Corporation, an Ohio corporation having an address at 6035 Parkland Boulevard, Cleveland, Ohio 44124-4141, owns all right, title and interest in the above-identified application by virtue of an Assignment recorded May 13, 2002 on Reel 012893, Frame 0898.

II. RELATED APPEALS AND INTERFERENCES

No other appeals or interferences are known to Appellants, Appellants' legal representative, or assignee, which would directly affect or be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

i. Claims originally filed: 1-35.

ii. Claims canceled: none.

iii. Claims added: none.

iv. Claims withdrawn from consideration but not canceled: none.

v. Claims allowed: none.

vi. Claims rejected: 1-35.

vii. Claims pending: 1-35.

viii. Claims on appeal: 1-35.

IV. STATUS OF AMENDMENTS

Thirty-five (35) claims were submitted in the subject application as originally filed.

A first Office action was mailed on September 5, 2003, rejecting claims 1-35. Responsive to that Action, an Amendment was filed on December 3, 2003, amending claims 1, 4, 5, 21, 25, 27, and 28.

A second and final Office action, mailed February 6, 2004, maintained the rejection of claims 1-35. A response under 35 U.S.C. § 1.116 was filed on May 6, 2004.

An Advisory Action mailed May 28, 2004, again maintained the rejection of claims 1-35.

Accordingly, the claims pending in the application are 1-35, inclusive, all of which are subject to the instant appeal. A clean copy of those claims is annexed hereto as "Appendix A."

V. SUMMARY OF THE INVENTION

The present invention as claimed is directed to electrically conductive impregnated fibers and their method of manufacture. More particularly, the invention relates to a method for treating electrically-conductive metal-coated-carbon fibers by impregnating the fibers with an organic wetting agent to form an impregnated fiber tow. The impregnated tow subsequently may be sheathed within a plastic to form an impregnated, sheathed tow. Such tow can be cut into pellets which, in turn, can be molded or otherwise processed into composite plastic articles. Such articles may be used in a wide variety of products, such as housings for electronic devices, providing radio-frequency and electromagnetic shielding.

By employing high levels of an impregnating organic wetting agent in the fiber tows, the pellets formed by the method of the invention may achieve a more uniform dispersion of the conductive fibers when molded or otherwise formed into the composite articles. Moreover, such composites, in having a more uniform dispersion of conductive fibers, exhibit improved electromagnetic shielding properties.

VI. ISSUE

Did the Examiner err in finally rejecting claims 1-35 under 35 U.S.C. § 103(a) as being unpatentable over WO 98/06551, in view of Bonazza, U.S. Patent No. 5,089,326; Kogusa *et al.*, U.S. Patent No. 4,960,642; and Devanathan, U.S. Patent No. 4,978,360; or Mayama *et al.*, U.S. Patent No. 4,530,779?

VII. GROUPING OF CLAIMS

For the purpose of the present appeal only, it is Applicants-Appellants' intention that the claims be grouped as follows:

i. Claims 1, 21, and 25 are considered to be patentable independently of the other claims, but as standing or falling together; and

ii. Claims 2-20, 22-24, and 26-35 are considered to stand or fall together with either claim 1, 21, or 25 from which each claim depends.

VIII. ARGUMENT

The Examiner erred in finally rejecting claims 1-35 under 35 USC §103(a) as being unpatentable over WO '551, in view of Bonazza, Kosuga et al., and Devanathan, or Mayama et al.

Claims 1-35 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over unpatentable over WO 98/06551, in view of Bonazza, U.S. Pat. No. 5,089,326; Kosuga *et al.*, U.S. Pat. No. 4,960,642; and Devanathan, U.S. Pat. No. 4,978,360; or Mayama *et al.*, U.S. Pat. No. 4,530,779. The originally commonly-assigned WO 98/06551 reference has been cited as teaching a process of making a sheathed impregnated fiber strand in the form of a heat-moldable pellet, wherein synthetic reinforcing fibers such as carbon or graphite fibers are impregnated with an organic wetting agent in a pan to coat substantially all of the fibers. The Bonazza has been cited as disclosing use of metal coated carbon fibers in making a fiber-reinforced composite.

The Examiner is of the opinion that it would have been obvious to use the fibers of Bonazza in the process of WO '551. Further, the Examiner is of the opinion that, although WO '551 does not teach feeding conductive fibers into a bath of wetting agent to impregnate the fibers, to do so would have been obvious and conventional in the art as exemplified by Devanathan or Mayama *et al.*

Kosuga *et al.* also as been applied to certain of the claims as drawn to a process of making pellets whereby electrically conductive fibers are impregnated with a wax to enhance the wetability of the fibers so that the fibers can be dispersed uniformly in a matrix resin.

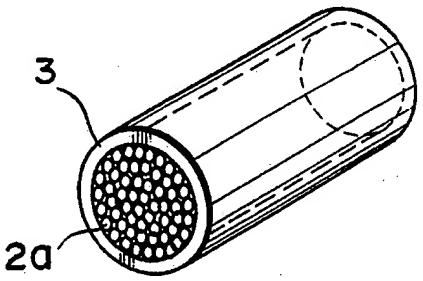
However, it is well-settled that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching, suggestion, or incentive supporting the combination. *In re Geiger*, 2 U.S.P.Q.2d 1276, 1278 (Fed. Cir. 1987), *citing ACS Hospital Systems, Inc. v. Montefiore Hospital*, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1987), *See also Gambro Lundia AB v. Baxter Healthcare Corp.*, 110 F.3d 1573, 1579, 42 USPQ2d 1378, 1383 (Fed.Cir.1997) (noting that the "absence of such a suggestion to combine is dispositive in an obviousness determination"). The Federal Circuit has cautioned that the suggestion to combine requirement is a safeguard against the use of hindsight combinations to negate patentability. *In re Rouffet*, 149 F.3d 1350 (Fed. Cir. 1998). Applicants-Appellants submits that even if the combination proposed by the Examiner would have been sufficient to render the claimed invention obvious, there can be found no suggestion or other motivation in

the prior art or otherwise which would have lead one of ordinary skill in the art to have combined the cited references in the manner proposed.

Considering then independent claims 1, 21, and 25, each of these claims describes a claim describes a method for forming electrically conductive impregnated fibers. Such method involves, *inter alia*, the steps of: (a) feeding metal coated carbon fibers into a bath containing an organic wetting agent to impregnate the fibers with the agent to form an impregnated fiber tow; and (b) applying a thermoplastic or thermoset sheath onto the tow.

The WO '551 reference, in contrast, is directed to a method wherein a chemical treatment is applied to fibers by means of an applicator 26 consisting of a roller and a pan. [*See* WO '551 at page 30, ll. 5-8 and 25-28; *see also* Fig. 2]. In view of this difference, the Examiner has proposed to modify the WO '551 method in view of either Mayama or Devanathan.

As to Mayama, the reference is directed to a process wherein a titanate coupling agent is coated onto the surface of a bundle of fibers. [*See* Mayama *et al.*, at col. 2, ll. 58-65]. That is, "[o]ne or more bundles 2a of a long fibrous conductive filler 2 are passed through a titanate coupling agent solution 11 for surface treatment." [col. 4, ll. 24-26]. "As shown in Fig. 2, a titanate coupling layer 3 is formed on the outer surface of a bundle 2a of fibrous conductive filler strands and a synthetic resin layer 1 is formed therearound." [col. 2, l. 66, bridging col. 3, l. 2].



Indeed, there is no teaching in Mayama that the titanate coupling agent is capable of penetrating the bundle to coat substantially all of the individual fibers thereof as required by WO '551. Accordingly, there would seem no reason, save for a hindsight reconstruction of the claimed invention, why one of ordinary skill in the art would have been motivated to modify the WO process in view of Mayama.

As to Devanathan, the reference teaches to pass a core of loosely gathered strands of carbon fiber into a heated bath filled with a molten polymer to impregnate the core and substantially contact all of the strands of carbon fiber and air eliminate air pockets. [Devanathan,

at col. 2, ll. 9-13]. Devanathan, however, appears directed to a process for applying the matrix resin rather than a sizing or other treatment which is applied to the fibers prior to their encasement in the matrix resin. Accordingly, it is submitted that one of ordinary skill in the art would not have looked to Devanathan as an answer to the problem of ensuring that all of the fibers in the bundle are impregnated with a sizing.

Regarding Bonazza, the Examiner has cited such reference as teaching the use of metal coated carbon fibers in making a fiber-reinforced composite having good mechanical properties and convenient possibility. However, Bonazza appears to be inapposite as directed to conductive fiber layers or plies which are laminated onto a support. [*See* Bonazza, at col. 3, l. 61, bridging col. 4, l. 13]. In this regard, Bonazza actually appears to teach against the use of metal coated carbon fibers for improving mechanical properties as the Examiner appears to have suggested. In any event, it is believed that the use of such fibers in plies which are laminated onto a support would not have motivated one of ordinary to use such fibers to make a pellet for injection molding, as recited in independent claims 1, 21, and 25, wherein the fibers ultimately are dispersed within plastic matrix.

In response to Applicants-Appellants' arguments regarding Bonazza, the Examiner has stated that Bonazza is applied to show that one in the art would have been motivated to use metal-coated carbon fibers in the WO '551 process rather than the use thereof would enhance the mechanical properties of a resultant fiber-reinforced article. In any event, it remains Applicants-Appellants' contention that the teachings of Bonazza, wherein metal-coated carbon fibers are used as a mat or other layer, would not have motivated one of ordinary skill in the art to use such fibers for forming an impregnated tow for use in making molding pellets.

Lastly, as to Kosuga, such reference has been applied, in addition to the foregoing references, against claims 21-24 which are directed to the use of a bath containing an organic wetting agent. However, and as similar to the WO '551 reference, Kosuga does not disclose the use of such a bath. Instead, Kosuga is directed to a method wherein a thermoplastic resin oligomer is extruded through an extruder. [See Kosuga et al., at col. 2, ll. 63-68]. Accordingly, Applicants-Appellants submit that Kosuga, whether taken singly or in combination, fails to militate against the patentability of the claimed invention.

In view of the foregoing, it is submitted that independent claims 1, 21, and 25 should be considered allowable as properly distinguishing over the art made of record. Dependent claims 2-20,

22-24, and 26-35 further describe the method of claim 1, 21, or 25, and therefore should be considered allowable for the reasons given in connection therewith.

IX. CONCLUSION

As the present claim program has been shown to properly distinguish over the art made of record, Applicants-Appellants respectfully urges the Board to overrule the rejection of the appealed claims and to permit the application to pass to issue.

Respectfully submitted,

Dated: July 30, 2004

John A. Molnar, Jr.
Reg. No. 36,611
Attorney for Applicants-Appellants

APPENDIX A
THE CLAIMS ON APPEAL

1. (Amended): A method for forming electrically conductive impregnated fibers, comprising the steps of:

(a) feeding electrically conductive metal coated carbon fibers into a bath containing an organic wetting agent to impregnate the fibers with the organic wetting agent forming an impregnated fiber tow, the applied organic wetting agent being at least 10 percent by weight of the resulting impregnated fiber tow; and

(b) applying a thermoplastic or thermoset sheath onto the impregnated fiber tow to form a sheathed, impregnated fiber tow.

2. The method according to claim 1, further comprising the step of:

(c) cutting the sheathed impregnated fiber tow into pellets.

3. The method according to claim 2, further comprising the steps of:

(d) introducing the pellets into a mold; and

(e) melting the pellets in the mold to form an electro-magnetic shielding composite, wherein the organic wetting agent enables the even distribution of the fibers in the composite.

4. (Amended) The method according to claim 1, further comprising, prior to step (a), the steps of:

(i) feeding out carbon fibers; and

(ii) applying metal coating to the carbon fibers.

5. (Amended) The method according to claim 4, wherein step (a)(ii) applying the metal coating, comprises electroplating carbon fibers with a metal coating.

6. The method according to claim 1, wherein step (a) is performed in-line.

7. The method according to claim 1, wherein the electrically conductive fibers of step (a) are fed out at a speed of less than about 150 feet/min.

8. The method according to claim 1, wherein impregnation step (a) comprises pulling the electrically conductive fibers through a bath containing the organic wetting agent.

9. The method according to claim 1, wherein the organic wetting agent is selected from the group consisting of coupling agents, film formers and mixtures thereof.

10. The method according to claim 9, wherein the organic wetting agent includes a film former selected from the group consisting of waxes, polyethylene glycols, polypropylene glycols, polycaprolactones, glycidyl ethers, epoxy resins, urethanes, polyester alkyds, amic acid, propylene glycol fumarate, propoxylated bisphenol-A-maleate, propoxylated allyl alcohol-maleate, polyvinyl acetates, olefins, low molecular weight polyesters and mixtures thereof, wherein the film former is capable of coating the individual electrically conductive fibers to form an impregnated tow.

11. The method according to claim 9, wherein the organic wetting agent includes a coupling agent selected from the group consisting of alcohols, amines, esters, ethers, hydrocarbons, siloxanes, silazanes, silanes, lactams, lactones, anhydrides, carbenes, nitrenes, orthoesters, imides, enamines, imines, amides, imides, functionalized olefins and mixtures thereof, wherein the coupling agent is capable of bonding the conductive fibers to the thermoplastic or thermoset sheath at a temperature ranging from about 100 to about 300 °C.

12. The method according to claim 8, wherein the bath is an aqueous emulsion of the wetting agent.

13. The method according to claim 1, wherein the impregnation step (a) comprises pulling the electrically conductive fiber through a nonaqueous bath containing the organic wetting agent and directly feeding the impregnated fiber tow to sheathing step (b).

14. The method according to claim 1, wherein the sheathing of the impregnated fiber tow is performed in-line with the impregnation step (a).

15. The method according to claim 2, wherein prior to cutting step (c) the sheathed electrically conductive fiber tow is wound into a package.

16. The method according to claim 2, wherein cutting step (c) is performed in-line with the sheathing of the impregnated fiber tow.

17. The method according to claim 2, wherein cutting step (c) comprises cutting the fiber tow into pellets having a length ranging from about 6 mm to about 13 mm.

18. The method according to claim 2, wherein the electrically conductive fiber tow is substantially on an axis of the pellet and extends the length of the pellet.

19. The method according to claim 1, wherein the organic wetting agent forms between 10 and 30 percent by weight of the impregnated fiber tow.

20. The method according to claim 1, wherein the organic wetting agent forms between 15 and 25 percent by weight of the impregnated fiber tow.

21. (Amended) A method for forming an electrically conductive impregnated fiber pellet, comprising the steps of:

(a) feeding out electrically conductive metal coated carbon fibers;

(b) pulling the electrically conductive fibers through a bath containing an aqueous emulsion of about 35-65 weight percent wax such that the wax impregnates the conductive fibers to form an impregnated tow, wherein the wax is present on the fibers in an amount ranging from about 10 to about 30 percent by weight of the resulting impregnated fiber tow;

(c) applying a thermoplastic or thermoset sheath onto the impregnated fiber tow; and

(d) cutting the impregnated fiber tow into pellets having a length of from about 6 to about 13 mm.

22. The method according to claim 21, wherein the sheath is a thermoplastic selected from the group consisting of polycarbonate resin, nylon, polybutylene terephthalate, polyethylene terephthalate, polystyrene, polypropylene, acrylontrile butadiene styrene, polyphenylene sulfide, polyether ether ketone, polyether imide, thermoplastic olefins, elastomers, and mixtures thereof, and the conductive fibers are present in the pellets in an amount of less than about 25 weight percent.

23. The method according to claim 1 wherein the impregnated fiber tow is pre-heated immediately prior to sheathing to facilitate impregnation by the sheath material.

24. The method according to claim 23 wherein the impregnated fiber tow is pre-heated using resistive heating.

25. (Amended) A method of making an electrically conductive strand material for the manufacture of a composite article, said article comprising a matrix material, said method comprising:

applying a composition comprising an organic wetting agent, or a thermoplastic or thermosetting polymer or precursor thereof, in an amount sufficient to coat substantially all of a plurality of fibers comprising electrically conductive metal coated carbon fibers to form preimpregnated fibers;

gathering the preimpregnated fibers into a preimpregnated strand having the composition disposed between substantially all of the plurality of fibers; and

encasing the preimpregnated strand with a thermoplastic or thermoset material to form an encased composite strand.

26. A method according to claim 25, wherein the step of applying the composition comprises:

(a) feeding the electrically conductive fibers into a bath containing an organic wetting agent to impregnate the fibers with the organic wetting agent forming an impregnated fiber tow, the applied organic wetting agent being at least 10 percent by weight of the resulting impregnated fiber tow; and

(b) applying the thermoplastic material onto the impregnated fiber tow to form a sheathed, impregnated fiber tow.

27. (Amended) The method according to claim 26, further comprising, prior to step (a), the steps of:

(i) feeding out carbon fibers; and

(ii) applying an metal coating to the carbon fibers.

28. (Amended) The method according to claim 27, wherein the step of applying the metal coating comprises electroplating carbon fibers with a metal coating.

29. The method according to claim 1, wherein the coating comprises an organic material having a viscosity, at a temperature range of 80 °C - 180 °C, no greater that 1500 cps.

30 The method of claim 29 wherein the viscosity of the organic material at a temperature range of 80 °C - 180 °C is no greater than 800 cps.

31. The method of claim 29 wherein the viscosity of the organic material at a temperature range of 80 °C - 180 °C is no greater than 400 cps.

32. The method of claim 29 wherein the viscosity of the organic material at a temperature range of 80 °C - 180 °C is no greater than 200 cps.

33. The method of claim 29 wherein the viscosity of the organic material at a temperature range of 80 °C - 180 °C is no greater than 75 cps.

34. The method of claim 29 wherein the viscosity of the organic material at a temperature range of 80 °C - 180 °C is no greater than 25 cps.

35. The method of claim 29 wherein the viscosity of the organic material at a temperature range of 80 °C - 180 °C is no greater than 5 cps.